

EDITORIAL

- 1241 Science for Future Physicians
Sharon Long and Robert Alpern

NEWS OF THE WEEK

- 1246 Chinese Scientists Hope to Make Deepest, Darkest Dreams Come True
- 1247 European Neutron Source Finally Finds a Home
- 1249 The Quaternary Period Wins Out in the End
- 1249 From *Science's* Online Daily News Site
- 1250 Report Finds No Gender Bias in Faculty Hiring, Resources
- 1250 Newsmaker Interview: Eugenie Scott Toils in Defense of Evolution
- 1251 From the *Science* Policy Blog
- 1252 The Biology of Genomes Meeting
Water Flea Boasts Whopper Gene Count
Some RNA May Play Key Role in Repressing Genes, Slowing Cancer
The Bug and the Bacterium: Interdependent Genomes

NEWS FOCUS

- 1254 ORIGINS
On the Origin of Sexual Reproduction
>> *Science Podcast*
- 1257 Hydrogen Cars: Fad or the Future?
- 1260 Persevering Researchers Make a Splash With Farm-Bred Tuna
Scientists Get No Respect From Fishery Managers
- 1262 The Tales Told by Lonely Galaxies

LETTERS

- 1264 Stem Cell Debate Extends to Scientists
S. Boackle
A Step Ahead on the HIV Collaboratory
R. L. Murphy et al.

- Keeping Mars Clean
W. R. Kramer
Life in Science: It Takes a Village
S. Kosten and G. Lacerot

1266 CORRECTIONS AND CLARIFICATIONS

BOOKS ET AL.

- 1267 Summer Reading:
Pages to Turn on a Lazy Day
- 1270 Beanworld
L. Marder, reviewed by L. K. Boerner
- 1271 The Housekeeper and the Professor
Y. Ogawa, reviewed by K. Ott
- 1271 Browsings

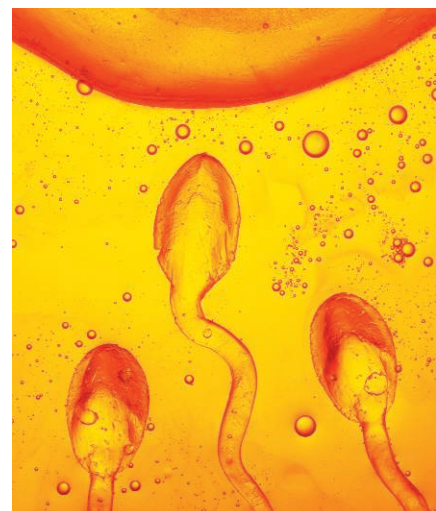
POLICY FORUM

- 1273 Assessing the Impact of Science Funding
J. Lane
>> *Science Podcast*

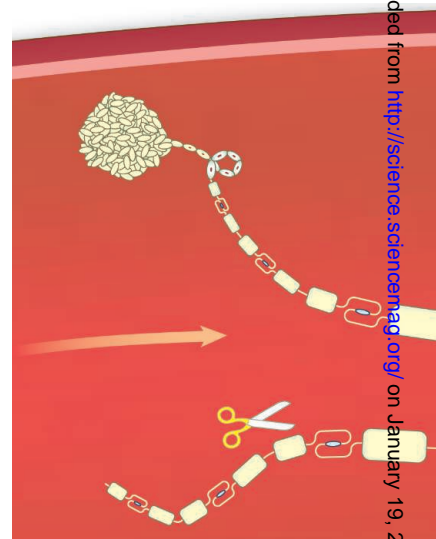
PERSPECTIVES

- 1276 Watching Nanocrystals Grow
C. B. Murray
>> *Report p. 1309*
- 1277 Dealing with Decoherence
J. Fischer and D. Loss
- 1278 Force Signaling in Biology
J. C. M. Gebhardt and M. Rief
>> *Report p. 1330*
- 1280 On Becoming Modern
R. Mace
>> *Research Article p. 1293; Report p. 1298; Science Podcast*
- 1281 Hypoxic Hookup
L. Guarente
>> *Research Article p. 1289*
- 1282 Amino Acid Addiction
J. M. Blander and D. Amsen
>> *Report p. 1334*

CONTENTS continued >>



page 1254



pages 1278 & 1330

Downloaded from <http://science.sciencemag.org/> on January 19, 2019



COVER

Herbert Newman's 1960s love song about the birds, bees, flowers, and trees inspired this cover, which celebrates the sixth essay, "On the Origin of Sexual Reproduction," in *Science's* monthly series honoring Darwin's 200th birthday. See page 1254.

Photos: Getty Images (birds, flower, tree); iStockphoto.com (bee)

DEPARTMENTS

- 1239 This Week in *Science*
- 1242 Editors' Choice
- 1244 *Science* Staff
- 1245 Random Samples
- 1341 New Products
- 1342 *Science* Careers

REVIEW

- 1284** Disulfide Formation in the ER and Mitochondria: Two Solutions to a Common Process
J. Riemer et al.

BREVIA

- 1288** Anthropogenic Impacts on Nitrogen Isotopes of Ice-Core Nitrate
M. G. Hastings et al.
The isotopic composition of nitrogen in nitrate deposited in Greenland has changed markedly over the past 150 years.

RESEARCH ARTICLES

- 1289** Regulation of Hypoxia-Inducible Factor 2 α Signaling by the Stress-Responsive Deacetylase Sirtuin 1
E. M. Dioum et al.
A deacetylase implicated in aging directly regulates a transcription factor that controls stress-responsive genes.
>> *Perspective p. 1281*
- 1293** Did Warfare Among Ancestral Hunter-Gatherers Affect the Evolution of Human Social Behaviors?
S. Bowles
Prehistoric conflict among humans could have favored the survival of groups containing altruists.
>> *Perspective p. 1280*

REPORTS

- 1298** Late Pleistocene Demography and the Appearance of Modern Human Behavior
A. Powell et al.
Population size and migration account for modern human behavior appearing in Africa about 90,000 years ago but much later across Europe.
>> *Perspective p. 1280*
- 1302** Pd-Pt Bimetallic Nanodendrites with High Activity for Oxygen Reduction
B. Lim et al.
The catalytic activity of platinum is enhanced through a growth process that creates nanocrystals with high surface area.
- 1306** Natural Quasicrystals
L. Bindi et al.
A sample of the mineral khatyrkite contains quasicrystals, which are ordered but lack the translational symmetry of crystals.
- 1309** Observation of Single Colloidal Platinum Nanocrystal Growth Trajectories
H. Zheng et al.
Transmission electron microscopy provides details of the growth mechanisms of platinum nanocrystals in solution.
>> *Perspective p. 1276*

- 1312** Large-Area Synthesis of High-Quality and Uniform Graphene Films on Copper Foils
X. Li et al.

Predominantly single-layer graphene films grow in a self-limited manner on copper and can be transferred to other substrates.

- 1314** Superconductivity at the Two-Dimensional Limit
S. Qin et al.

Superconductivity persists in lead films down to just two monolayers thick.

- 1318** Social Transmission of a Host Defense Against Cuckoo Parasitism

N. B. Davies and J. A. Welbergen

Social learning and predisposition explains why reed warblers mob parasitic cuckoos but not innocuous parrots.

- 1320** Epigenetic Temporal Control of Mouse *Hox* Genes in Vivo

N. Soshnikova and D. Duboule

A time-dependent transition in chromatin modifications parallels the sequential activation of genes involved in embryo organization.

- 1323** McsB Is a Protein Arginine Kinase That Phosphorylates and Inhibits the Heat-Shock Regulator CtsR

J. Fuhrmann et al.

A protein kinase can specifically target arginine residues in a transcription factor to regulate its DNA binding.

- 1327** Rhes, a Striatal Specific Protein, Mediates Mutant-Huntingtin Cytotoxicity

S. Subramaniam et al.

A small G protein localized in the brain striatum may explain the localized neurodegeneration observed in Huntington's disease.

- 1330** Mechanoenzymatic Cleavage of the Ultralarge Vascular Protein von Willebrand Factor

X. Zhang et al.

Mechanical forces regulate the length of von Willebrand factor multimers and thus regulate thrombogenic potential.

>> *Perspective p. 1278*

- 1334** Halofuginone Inhibits T_H17 Cell Differentiation by Activating the Amino Acid Starvation Response

M. S. Sundrud et al.

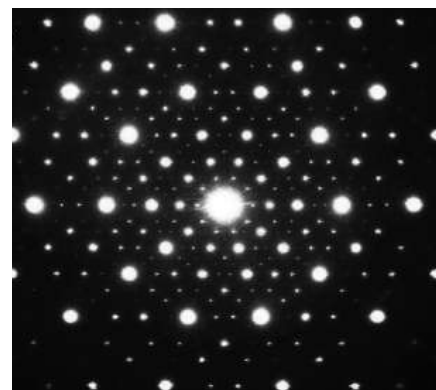
Activation of the amino acid starvation response inhibits differentiation of a subset of inflammatory T cells.

>> *Perspective p. 1282*

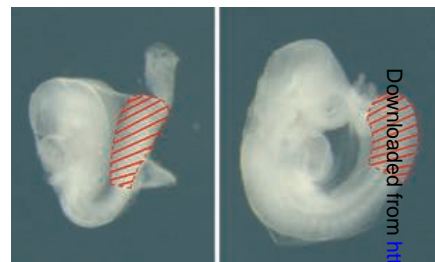
- 1338** Endogenous Activation Patterns of Cdc42 GTPase Within *Drosophila* Embryos

D. Kamiyama and A. Chiba

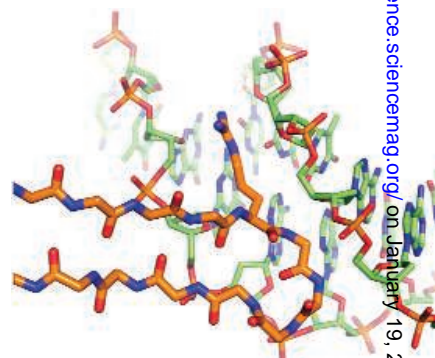
Bioprobe imaging reveals precise patterns of activation for a signaling protein in the neurons of intact animals.



page 1306



page 1320



page 1323

CONTENTS continued >>>

SCIENCEONLINE

SCIENCEEXPRESS

www.scienceexpress.org

Amplified Trace Gas Removal in the Troposphere

A. Hofzumahaus et al.

A yet undescribed pathway for hydroxyl radical production is needed to account for reaction rates of highly polluted air.

10.1126/science.1164566

Extending Universal Nodal Excitations Optimizes Superconductivity in $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$

A. Pushp et al.

Scanning tunneling spectroscopy reveals strong electronic correlations in the insulating state of a cuprate superconductor.

10.1126/science.1174338

Auxin-Dependent Patterning and Gamete Specification in the *Arabidopsis* Female Gametophyte

G. C. Pagnussat et al.

An auxin gradient is involved in cell fate specification of the female sex cells in flowering plants.

10.1126/science.1167324

IRAP Identifies an Endosomal Compartment Required for MHC Class I Cross-Presentation

L. Saveanu et al.

Immunological dendritic cells contain an endocytic compartment involved in the cross-presentation of internalized antigens.

10.1126/science.1172845

RIP3, an Energy Metabolism Regulator That Switches TNF-Induced Cell Death from Apoptosis to Necrosis

D.-W. Zhang et al.

The protein kinase RIP3 mediates necrotic cell death, likely through regulation of metabolic enzymes.

10.1126/science.1172308

SCIENCENOW

www.sciencenow.org

Highlights From Our Daily News Coverage

Thin the Air, Save the Biosphere?

A team suggests a way to prevent plant Armageddon.

Embryonic-Like Cells Advance Toward Disease Treatment

Researchers find ways to increase safety and to generate genetically tailored cells.

A Billion-Year Hard Drive

A new process could preserve digital data, essentially forever.

SCIENCESIGNALING

www.sciencesignaling.org

The Signal Transduction Knowledge Environment

RESEARCH ARTICLE: Involvement of the Protein Kinase CK2 in the Regulation of Mammalian Circadian Rhythms

Y. Tsuchiya et al.

Protein kinase CK2 promotes PERIOD2 degradation and modulates the mammalian circadian clock.

PERSPECTIVE: Allosteric Effects Govern Nuclear Receptor Action—DNA Appears as a Player

H. Gronemeyer and W. Bourguet

DNA sequences regulate glucocorticoid receptor activity.

NETWATCH: PANTHER

Explore a database of proteins classified by function; in Bioinformatic Resources.

NETWATCH: Inside Cancer

Learn about the cell biology of cancer through interactive multimedia resources; in Educator Sites.

SCIENCECAREERS

www.sciencecareers.org/career_magazine

Free Career Resources for Scientists

A Bioethicist's Work Bridges Science, Law, and Religion

C. Wald

An erroneous conference invitation prompted Jennifer Miller to pursue a bioethics career.

Taken for Granted: Building a Culture of Safety

B. L. Benderly

An investigation of a fatal UCLA fire shows how many academic labs can be made safer.

Weighty Research in Microgravity

E. Pain

A physician and an engineering student are preparing experiments in microgravity for a European Space Agency competition.

SCIENCEPODCAST

www.sciencemag.org/multimedia/podcast

Free Weekly Show

Download the 5 June *Science* Podcast to hear about returns on science investments, human social evolution, the origin of sexual reproduction, and more.

ORIGINSBLOG

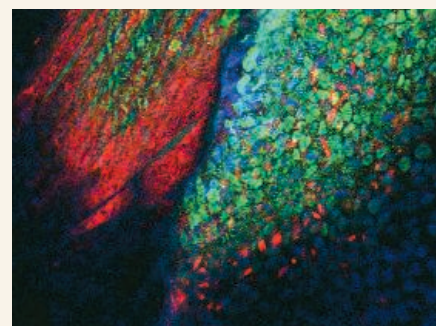
blogs.sciencemag.org/origins

A History of Beginnings

SCIENCEINSIDER

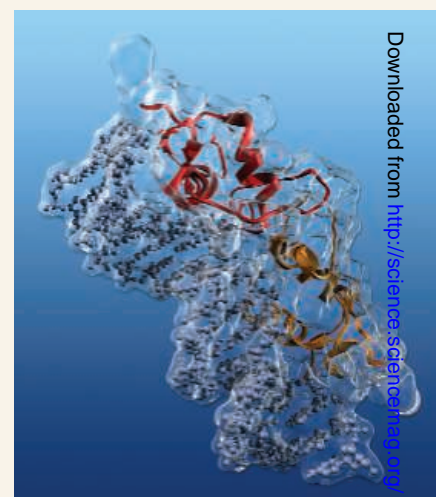
blogs.sciencemag.org/scienceinsider

Science Policy News and Analysis



SCIENCENOW

Genetically corrected cells.



SCIENCESIGNALING

Glucocorticoid receptor–DNA complex.

SCIENCE (ISSN 0036-8075) is published weekly on Friday, except the last week in December, by the American Association for the Advancement of Science, 1200 New York Avenue, NW, Washington, DC 20005. Periodicals Mail postage (publication No. 484460) paid at Washington, DC, and additional mailing offices. Copyright © 2009 by the American Association for the Advancement of Science. The title SCIENCE is a registered trademark of the AAAS. Domestic individual membership and subscription (51 issues): \$146 (\$74 allocated to subscription). Domestic institutional subscription (51 issues): \$835; Foreign postage extra: Mexico, Caribbean (surface mail) \$55; other countries (air assist delivery) \$85. First class, airmail, student, and emeritus rates on request. Canadian rates with GST available upon request, GST #1254 88122. Publications Mail Agreement Number 1069624. **Printed in the U.S.A.**

Change of address: Allow 4 weeks, giving old and new addresses and 8-digit account number. **Postmaster:** Send change of address to AAAS, P.O. Box 96178, Washington, DC 20090-6178. **Single-copy sales:** \$10.00 current issue, \$15.00 back issue prepaid includes surface postage; bulk rates on request. **Authorization to photocopy** material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Act is granted by AAAS to libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service, provided that \$20.00 per article is paid directly to CCC, 222 Rosewood Drive, Danvers, MA 01923. The identification code for *Science* is 0036-8075. *Science* is indexed in the *Reader's Guide to Periodical Literature* and in several specialized indexes.



ADVANCING SCIENCE. SERVING SOCIETY

Science

324 (5932)

Science **324** (5932), 1239-1341.

ARTICLE TOOLS

<http://science.sciencemag.org/content/324/5932>

PERMISSIONS

<http://www.sciencemag.org/help/reprints-and-permissions>

Use of this article is subject to the [Terms of Service](#)

Science (print ISSN 0036-8075; online ISSN 1095-9203) is published by the American Association for the Advancement of Science, 1200 New York Avenue NW, Washington, DC 20005. 2017 © The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works. The title *Science* is a registered trademark of AAAS.